competition with algae, sedimentation, and a variety of other mechanisms (Ritson-Williams *et al.* 2009). Thus, in places similar to the Florida Keys, to harness the benefits of connectivity to boost recruitment, it may be necessary to "prime" restoration sites by promoting other ecological processes, such as herbivory or consumer-derived nutrients, that can foster transitions toward benthic communities more amenable to successful coral recruitment (Shantz *et al.* 2015). Indeed, much of our discussion focuses on leveraging ecological processes to make areas being restored more suitable for increased recruitment of corals (Ladd *et al.* 2018), and therefore implicitly considers connectivity with regard to coral recruitment. However, we agree that explicitly considering metapopulation connectivity in restoration planning would facilitate the selection of sites most likely to respond positively to restoration efforts.

Yet metapopulation connectivity dynamics are complex and difficult to quantify; as a result, we often have an incomplete understanding regarding the degree to which populations are connected. Further, there is considerable variability in larval dispersal among taxa, suggesting that understanding connectivity for restoration will depend on the species being considered and their life-history traits (Giangrande *et al.* 2017). If the goal of restoration is to maximize connectivity to increase the recovery rates of corals, then one might choose different reefs to restore than if the goal of restoration is to increase fish populations via restoring corals, given that dispersal and connectivity of these different taxa likely vary substantially (Gaines *et al.* 2007).

The important role of metapopulation connectivity in predicting the distribution of organisms across a landscape, and thus in planning large-scale restoration efforts (as stated by D&B), highlights the need for more research focused on population connectivity. Like the approaches discussed in our paper (Ladd *et al.* 2018), the extent to which metapopulation connectivity can facilitate restoration success will be highly context-dependent. As our ability to measure and understand spatial and temporal connectivity among populations improves (Castorani *et al.* 2017), so will our capacity to incorporate metapopulation connectivity into restoration planning.

The ability to plan coral restoration projects with solid knowledge of connectivity for fishes and corals on reefs would be an ideal scenario. However, understanding patterns in connectivity in marine ecosystems is expensive and time consuming. Given that much of the need for coral restoration is in developing countries where connectivity studies are often lacking, relying on understanding connectivity patterns before conducting restoration may seriously hamper important restoration efforts. We certainly encourage using knowledge of connectivity to help inform restoration where possible. However, where this knowledge does not exist, or could not be easily gained, coral restoration should proceed using the best available natural history and ecological knowledge to help facilitate the scope and pace of restoration. We should not let the perfect be the enemy of the good.

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Lost food narratives can grow human health in cities

As urban land becomes more valuable, its use in food production is increasingly less justified, practically and economically. Despite having achieved food sufficiency in most developed countries, there are still serious problems with respect to food access and waste (Foley *et al.* 2011). Urban agriculture is unlikely to provide enough food for the burgeoning human population, particularly where it is most needed. New urban farming models often emerge, only to fail in the absence of regulations, resources, and commitment. At the same time, as urbanization and technology physically detach humanity from nature, unprecedented crises in human health are on the rise (Flies *et al.* 2017).

This presents an opportunity to find new reasons and values for urban agriculture, and to rediscover its meaningful place in the cities of the future. We argue that it is time for urban agriculture to be elevated from a niche practice for "eco-minded foodies" to a critical asset for public health and social well-being, much like hospitals, pharmacies, and nursing homes. Through food, a new agrarian urbanism can provide much needed links for urban communities to interact with the environment, offering benefits that reach far beyond produce alone, such as those related to improving human health. We believe that historical food narratives – the stories, which have largely been lost over the course of time, of produce and its people – can provide guidance in this effort.

Modern humans' diets are losing their ancestral diversity as fast as our enteric biota are losing their species richness (De Filippo *et al*. 2010). Contact with many of our "old friends" – the beneficial microorganisms living in the natural environment – has been lost or diminished (Rook 2013), thus increasing the prevalence of allergies and inflammatory diseases (Hanski *et al*. 2012). Food narratives from early cities suggest the importance of urban agriculture for not only cultivating produce, but also enriching medicine and human microbiomes. Touching, smelling, and eating urban food can bring the beneficial microbes living on or in soils, plants, and wildlife closer to the skins and guts of urban dwellers (Figure 1, a and b). Cities will soon need to farm to "grow" healthy immune systems and microbiomes, particularly in children. Growing urban food is a simple tactile solution to counter increasingly dysbiotic lifestyles.

Although food production is at its historical peak, the variety of foods available in supermarkets adds little diversity to human diets, with most foods often having similar nutrient profiles. As "fast" and inexpensive food has dramatically increased in abundance, so too has the incidence of obesity and cardiovascular diseases. History has rarely been a time of plenty, but while cultivating their food, our ancestors were often preserving old plant varieties and animal breeds or crossing new ones (Figure 1c). Future cities will need to support the development of gene banks to conserve the thousands of heirloom varieties of fruits and vegetables that are disappearing, together with their nutrients, tastes, and abilities to enrich our gut microbiomes (McDonald *et al*. 2018). Urban gardens in future cities can serve as living "food dispensers", helping to promote more diverse diets.

A not-too-distant future also promises virtual realities to further disconnect humans from outdoor environments. A substantial portion of human sociality now develops in digital "worlds" (settings), which may contribute to psychological disorders, including anxiety and depression (Andreassen *et al*. 2016). Narratives of past urban agriculture portray food production systems where communities and social networks developed together with produce. Food was everyone's need, business, and topic of conversation (Figure 1b). By looking at our past, residents of future cities can rediscover how to encourage sociality through a new agrarian urbanism, centered on personal and social interactions that reoccur in the urban outdoors. Strengthening the social ties to food will also teach future youth about its value in nurturing human health and helping to preserve our socio-agroecological memory (Barthel *et al*. 2010; Guitart *et al*. 2014).

Food oligopolies in the developed world are ultimately leaving people with little control over the food systems that feed them (Bhuyan and Lopez 1997). Yet lost food narratives depict urban communities literally built for and around produce (Figure 1d). In the past, fresh produce, often protected within city walls as a valuable commodity, was locally grown by many and valued by all. Guided by the low-density agrarian urbanism of Maya and Aztec cities in Mesoamerica (Isendahl and Smith 2013), tomorrow's urban planners will need to develop and implement bold visions (including those related to biodiverse foodscapes, agri-

Figure 1. (a) Aztec peasants were exposed to microbes and helminths in the environment by digging soil and growing crops within a walled garden in ancient Mexico. Detail from the Codex Osuna (1563–66) by Jerónimo de Valderrama. Courtesy: Biblioteca Nacional de España, Madrid, Spain (ref number Vitr/26/8, folio 38v). (b) A medieval community tending an herb and medicinal garden within a 15th-century city. Detail from the Le Liure de Rustican des Prouffiz Ruraulx by Piero de' Crescenzi. Courtesy: © British Library Board (Add. 19720, f.165). (c) A painting by Bartolomeo Bimbi portraying the 115 different varieties of pears grown in the Grand Duchy of Tuscany in the late 1600s. Courtesy: Ministry of Cultural Heritage and Activities and Tourism, Museum of Still Life, Villa Medicea, Poggio a Caiano, Italy. (d) The city of Pisa, Italy, in the 1600s scattered with community gardens ("orti") within its city walls. Detail of a copperplate engraving by Matthäus Merian. Courtesy: www.trippini.it.

hoods, food forests, and urban orchards) to help ensure reliable, safe, and equitable access to food and rediscover its forgotten benefits for human health (Alaimo *et al.* 2016).

We argue that humanity should not sacrifice past food narratives in exchange for modern food systems devoid of nutritional, biological, and social values. Food production in cities will certainly not outcompete modern industrial agriculture, but it is a proven solution that brings beneficial microbes onto our skin, lost nutrients back into our bodies, and well-being among our communities.

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